1139-34-620 **Vardayani Ratti*** (vardayani.ratti@dartmouth.edu), 27 N Main Stret, 314 Kemeny Hall, Hanover, NH 03755, and **Peter G. Kevan** and **Hermann J. Eberl**. *A mathematical approach to study loss of honeybee colonies infested with varroa destructor and deadly viruses.*

Honeybee (*Apis mellifera*) colonies continue to experience high annual losses that remain poorly explained. Among the many stressors that were proposed, parasitic varroa mites have been identified as one of the main culprits. These mites, in addition to being harmful to the bees themselves, are also the vector for several bee viruses.In this project, we study a mathematical model for the honeybees-*varroa destructor*-virus complex. We study this model with a combination of analytical and numerical techniques. We find that the bee colony is never able to fight off mites. We also find that depending on parameters, in a colony that is not treated with varroacides mites can establish themselves leading to colonies with slightly reduced number of bees; if some of these mites carry the virus, however, the colony might fail suddenly after several years without a noticeable sign of stress leading up to the failure. The immediate cause of failure is that at the end of Fall colonies are not strong enough to survive the Winter in viable numbers. We investigate the effect of the initial disease infestation on collapse time, and how varroacide treatment affects longterm behavior. We find that to control the virus epidemic, the mites as disease vector should be controlled. (Received February 20, 2018)